Federal Highway Administration (FHWA) Research and Technology Agenda

Meeting the Challenge: Planning, Environment, and Realty

When developing projects, transportation professionals must consider the complex relationships among a variety of factors affecting individuals, communities, the economy, and the environment. FHWA's Planning, Environment, and Realty research supports this work by assessing new tools and processes that make better decisions, leading to improved outcomes.

FHWA provides tools, technical assistance, proven processes, and data so State and local agencies can perform effective project planning, environmental, and realty decisionmaking. Enhanced coordination across disciplines leads to more efficient project delivery and better resource conservation. The result is a safer, more reliable, and accessible transportation system that is environmentally sound and responsive to the public's needs.

FHWA's research promotes techniques and processes that help society to adapt to extreme weather and climate change by constructing or renovating infrastructure to withstand these events. It also evaluates projects based on sustainability principles. FHWA also is researching project impacts on adjacent communities from air quality and noise changes.

FHWA helps transportation professionals strengthen their processes by providing new tools and strategies. Expanded geographic information systems (GIS) technologies will incorporate livability principles into transportation planning. Environmental impact mitigation will be better coordinated with climate change adaptation.

Additional areas of focus include:

- Context sensitive solutions.
- Economic development.
- Nondiscrimination and environmental justice.
- Community improvements.
- Community impact assessment.
- Pedestrians and bicyclists.

Following the principles of integrated transportation decisionmaking, FHWA forms partnerships with professionals in the fields of transportation planning, resource conservation, and realty to refine its research priorities. Together, they are identifying opportunities and developing new approaches that advance the practice.

Objective: 1: Promote more informed transportation decisionmaking to improve transportation planning, programming, operations, and coordination.

Strategies

- Help transportation agencies build institutional capacity to support transportation planning, programming, operations, and management decisionmaking.
- Identify and promote cutting-edge technologies that support stakeholders in meeting Federal planning, environmental, and realty requirements.
- Research, develop, and promote strategies that improve surface transportation system planning, operation, and management, as well as environmental, planning, and realty decisionmaking.

Showcase Activities

- Environmental Review Toolkit Section 4(f) Tutorial
- e-NEPA Tool
- Mapping the National Highway System (NHS)
- Considering Security and Emergency Management in the Planning of Transportation Projects
- Business Relocation
 Assistance Retrospective
 Study
- Regional Border Master Plans

Environmental Review Toolkit Section 4(f) Tutorial

FHWA developed the online Environmental Review Toolkit as a one-stop resource to provide up-to-date information on transportation and environmental policy, guidance, best practices, and training. These efforts help translate research into practice, enable agencies to use environmental streamlining approaches, and reduce environmental impacts and improve project delivery. An important toolkit item is the Section 4(f) Tutorial, which provides an ondemand overview of Section 4(f) to help project development specialists, engineers, resource agencies, and other stakeholders understand this sometimes complicated process. Section 4(f) requires consideration of park and recreation lands, wildlife and waterfowl refuges, and historic sites during transportation project development.

Activity Contact

Planning and

Programming (PBPP): Guidebook Series

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Additional Resources

- FHWA: Environmental Review Toolkit
- FHWA: Section 4(f)
 Tutorial

e-NEPA Tool

e-NEPA is a real-time electronic collaboration tool that allows State departments of transportation to share documents, track comments, schedule tasks with participating agencies, and perform concurrent reviews of their environmental impact statements and environmental assessment projects.

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Additional Resources

• Improving Collaboration and Quality
Environmental
Documentation (eNEPA and IQED)

Mapping the National Highway System (NHS)

The National Highway System includes the Interstate, other principal arterials, the Strategic Highway Network, and intermodal connectors. FHWA uses digital spatial databases and maps to continuously record and maintain the official map record of the National Highway System. The research supports mapping activities to aid environmental, planning, and realty decisionmaking. The map sets are coded onto a geospatial digital highway network that FHWA uses to produce maps posted on the National Highway System Web site.

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•	FHWA: National
	Highway System

Considering Security and Emergency Management in the Planning of Transportation Projects

This guide was developed to increase awareness about security and emergency management. The main audience is the transportation infrastructure project community, especially State departments of transportation and regional metropolitan planning organizations.

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Additional Resources

• FHWA: Considering
Security and Emergency
Management in the
Planning of
Transportation Projects

Business Relocation Assistance Retrospective Study

FHWA strives to ensure that rights-of-way acquired for federally funded projects and programs are acquired in manners that comply with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act, or Uniform Act of 1970. The Business Relocation Assistance Retrospective study analyzes the actual costs that businesses incur as a result of having to relocate for a public transportation project. The study also identifies types of benefits and services that relocated businesses believe will best ensure successful business relocation. This information will help FHWA and other stakeholders assess the adequacy of the current benefit levels.

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Additional Resources

- FHWA: Acquisition:
 Acquiring Real Property
 for Federal and
 Federal-Aid Programs
 and Projects
- FHWA: Relocation: Your Rights and Benefits as a Displaced Person

Regional Border Master Plans

The Joint Working Committee participates in a series of border master planning activities across the United States and Mexico border. The border master plans are adapted to the local needs although they are usually at the State or regional level. The master plans include a comprehensive and prioritized assessment of transportation needs along the border including at the ports of entry. The plans represent binational stakeholder efforts to prioritize and promote ports of entry and related transportation projects; inform decisionmaking; allocate limited funding sources; and ensure continued dialogue and coordination on current and future ports of entry; and support transportation infrastructure needs and projects.

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Additional Resources

• FHWA: Regional Border Master Plans

Integrating Demand Management into the Transportation Planning Process: A Desk Reference

This desk reference provides the reader with a better understanding of where, how, and when to integrate Travel Demand Management (TDM) into performance-based transportation planning processes. It also discusses how Travel Demand Management can be integrated into four levels of transportation planning from the State down to the local level and includes information on tools available for evaluating the effectiveness of Travel Demand Management measures.

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Additional Resources

• FHWA: Integrating
Demand Management
into the Transportation
Planning Process

Asset Sustainability Index (ASI)

This report examines the concept of a suite of proposed performance measures centered on an Asset Sustainability Index. The metrics are examined primarily for State transportation agency officials, but they could be useful to all who manage transportation networks at the national, State, regional, or local level. Increasingly, these officials are expected to demonstrate they are operating responsibly and transparently.

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Additional Resources

• FHWA: Asset
Sustainability Index: A
Proposed Measure for
Long-Term Performance

Performance-Based Planning and Programming (PBPP): Guidebook Series

To address the need for technical information on performance-based planning and programming (PBPP), FHWA has engaged partners and stakeholders to help develop a series of three guidebooks, as follows:

- Performance-Based Planning and Programming (PBPP) Guidebook
- Model Long-Range Transportation Plans: A Guide for Incorporating Performance-Based Planning (LRTP)
- Performance-Based Electronic STIP (E-STIP)

The guidebooks will be developed to serve as practical resources to help State departments of transportation, metropolitan planning organizations, regional transportation planning organizations, and transit agencies understand what the key elements of performance-based planning and programming are, and how this approach fits within the existing statewide and metropolitan planning and programming processes.

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Additional Resources

• <u>Performance-Based</u> <u>Planning and</u> <u>Programming Guidebook</u>

Objective: 2: Promote integrated planning that improves transportation safety and addresses environmental, social, and economic needs.

Strategies

- Investigate and promote strategies that integrate safety into the planning and project development processes.
- Investigate and promote strategies that facilitate transportation coordination among diverse stakeholders and improve the exchange of information.
- Investigate and promote strategies to facilitate cross-border transportation planning, decisionmaking, and coordination.
- Research and promote strategies that support environmental streamlining and stewardship for transportation projects, and improve projects' environmental sustainability.
- Research, develop, and improve models, indicators, and tools to evaluate the economic, social, and environmental performance of transportation systems.
- Conduct research and provide technical assistance to transportation stakeholders to help them incorporate environmentally sustainable practices in transportation project development, programming, and planning.

Showcase Activities

- National Transportation Liaison Community of Practice
- Infrastructure Voluntary Evaluation Sustainability Tool (INVEST)
- United States/Canada and United States/Mexico Binational Planning and Operations
- Metropolitan Area Transportation Planning for Healthy Communities
- Integrated Transportation Scenario Planning
- A Performance-Based Approach to Addressing Greenhouse Gas
 Emissions through Transportation Planning

National Transportation Liaison Community of Practice

Transportation liaisons facilitate the environmental and permit review processes for transportation projects by providing technical assistance and coordinating between resource and regulatory agencies, State departments of transportation, and metropolitan planning organizations. FHWA created a Transportation Liaison Community of Practice (CoP) to assist liaisons in sharing information and resources. The CoP includes a Web site open to transportation liaisons and liaison managers, and State DOT, Federal Highway Administration, and resource and regulatory agency staff. The Web site features a resource library, calendar of events, and profiles of liaison peers. The Web site allows users to indicate their areas of expertise and post resources and events to the site's calendar of events. FHWA also supports five national liaisons, who help coordinate activities between their agencies and FHWA at a national level. The five liaisons are located in the U.S. Army Corps of Engineers; U.S. Coast Guard; Environmental Protection Agency; U.S. Fish and Wildlife Service; and the Advisory Council on Historic Preservation. In addition, FHWA works to develop outreach and technical assistance materials to continue to support transportation liaisons.

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Additional Resources

- FHWA: Transportation
 Liaison Community of
 Practice
- FHWA: Transportation
 Liaison Community of
 Practice Discussion Board

Infrastructure Voluntary Evaluation Sustainability Tool (INVEST)

The online resource, Infrastructure Voluntary Evaluation Sustainability Tool (INVEST) (Version 1.0 released in October 2012), identifies characteristics of sustainable highways and provides information and techniques to help stakeholders make informed decisions with limited resources while balancing the economic, social, and environmental factors associated with transportation projects. Developed with input from State and local transportation leaders and several professional organizations, the tool is available online at www.sustainablehighways.org.

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Additional Resources

• FHWA: Infrastructure Voluntary Evaluation Sustainability Tool

United States/Canada and United States/Mexico Binational Planning and Operations

Binational planning for the efficient and safe cross-border movement of goods and people, while protecting the environment, brings special challenges to State, regional, and Federal transportation and security agencies. This program will develop and deliver a combination of research, education, best practices examples, and roundtable work sessions specifically targeted to enhance cross-border transportation planning, project development, and improved flow between the United States and Canada and Mexico. This research effort will address binational and North American issues and bring together transportation planners, environmental specialists, security experts, and others to engage in dialog and implement research to improve cross-border coordination for transportation planning, project development, and enhanced operations.

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Additional Resources

• FHWA: United
States/Mexico Border
Transportation Planning
Web Sites

Metropolitan Area Transportation Planning for Healthy Communities

This report proposes a framework for metropolitan planning organizations and partners to use to integrate health into metropolitan area transportation planning, and how they can consider health during all stages of the metropolitan area transportation planning process. The report identifies a "holistic" approach to health; including consideration of active transportation, safety, air pollution, and access to opportunities for healthy lifestyles.

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Additional Resources

• FHWA: Metropolitan
Area Transportation
Planning for Healthy
Communities

Integrated Transportation Scenario Planning

Regional transportation scenario planning has emerged as a common planning technique to track the development and expansion of regional scenario planning. The practice of evaluating land use has more recently involved the analysis of other nontraditional factors, such as climate change, housing, and economic development. Scenario planning provides a framework for developing a shared vision for the future by analyzing various forces that affect growth.

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Additional Resources

• Scenario Planning

A Performance-Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning

The intent of this practitioner handbook is to serve as a resource for State departments of transportation and metropolitan planning organizations interested in addressing greenhouse gas emissions through performance-based planning and programming. Building on resources that address performance-based planning and programming and mobile source emissions analysis, the handbook describes the use of greenhouse gas performance measures and other performance management techniques to support investment choices and decisionmaking.

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• FHWA: A Performance-Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning

Objective: 3: Streamline the project delivery process.

Strategies

- Research and promote strategies and tools available to accelerate project delivery and evaluate how to accomplish project delivery under a range of circumstances.
- Provide technical assistance to support stakeholders in improving project delivery processes.

Showcase Activities

- Eco-Logical
- Center for Environmental Excellence
- Public Involvement Reference Tool
- Tribal Transportation Planning Modules

Eco-Logical

A team of representatives from FHWA and seven other Federal agencies developed Eco-Logical, an infrastructure development process based on an ecosystem viewpoint. Eco-Logical integrates plans and data across agency and disciplinary boundaries and encourages Federal, State, Tribal, and local partners' involvement in infrastructure planning, design, review, and construction. FHWA continues to engage signatory agency leadership to ensure the use and support of Eco-Logical. Products include writing three issues of Eco-Logical Successes (with a fourth edition in development) and the Eco-Logical Webinar Series that highlights the practices, concepts, and case studies through a series of monthly Eco-Logical webinars.

Activity Contact

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Additional Resources

• FHWA: Eco-Logical

Center for Environmental Excellence

The Center for Environmental Excellence, which was developed in cooperation with the American Association of State Highway and Transportation Officials and FHWA, promotes environmental stewardship and encourages innovative ways to streamline the transportation delivery process. The center serves as a one-stop source for transportation professionals seeking technical assistance, training, information exchange, partnership-building opportunities, and quick and easy access to environmental tools.

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Additional Resources

• Center for Environmental Excellence by AASHTO

Public Involvement Reference Tool

The Public Involvement Reference Tool is a technical resource for transportation professionals and the public. The reference tool is designed to help you find specific public involvement documents, discover and share best practices, and to assist State transportation agencies to improve their transparency, efficiency, and accountability. This reference tool encourages more open governmental decisionmaking that facilitates citizen participation and collaboration.

Activity Contact

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Email: lorrie.lau@dot.gov **Additional Resources** • FHWA: Public Involvement Reference Tool **Tribal Transportation Planning Modules Activity Contact** The Transportation Decisionmaking: Information Tools for Tribal Governments Training Series provides modules for eleven planning topics. The training modules are designed to assist Michelle Noch transportation professionals responsible for planning for the capital, operating, and maintenance FHWA Office of Planning, needs on tribal lands. Environment, and Realty Tel: 202-366-9206 Email: michelle.noch@dot.gov Objective: 4: Minimize environmental impacts of transportation investments. **Showcase Activities Strategies** • Develop and promote strategies, tools, and capacity-building opportunities that improve • Assessing Transportation mitigation and adaptation responses to climate change, and improve stakeholders' Impacts on Air Quality understanding of the effects of climate change on transportation. • Near Road Studies • Conduct research to develop and promote strategies that improve transportation stakeholders' • The Gulf Coast Study abilities to address transportation-related air quality issues. **Assessing Transportation Impacts on Air Quality Activity Contact** Transportation agencies employ air quality models to assess emissions levels and make informed planning and programming decisions. The Environmental Protection Agency model, called Motor Cecilia Ho Vehicle Emission Simulator (MOVES), estimates emissions for mobile sources, including cars, FHWA Office of Natural trucks, and motorcycles for a broad range of pollutants. FHWA researched and developed methods Environment that help stakeholders convert data to use with Motor Vehicle Emission Simulator; shared Tel: 202-366-9862 information with stakeholders regarding anticipated data changes; and identified additional data Email: cecilia.ho@dot.gov_

collection and research needs to fully utilize the capabilities of Motor Vehicle Emission Simulator and other related tools and models. As a result of these activities, transportation planners and others using Motor Vehicle Emission Simulator are able to take full advantage of the model's capabilities to better assess emissions and air quality impacts of transportation programs and projects.

- Volpe: MOVES2010a Regional Sensitivity Analysis
- FHWA: Advances in Project Level Analyses Final Report
- FHWA: Modifying Link-Level Emissions Modeling Procedures for Applications within the MOVES Framework Final Report

Near Road Studies

FHWA is focused on enhancing the understanding of mobile source emissions associated with major highway facilities. The Near Road Studies examine the concentration and physical behavior of Mobile Source Air Toxics, mobile source Particulate Matter 2.5, and other criteria pollutants in regions nationwide. These studies give stakeholders hands-on knowledge about the dispersion of mobile source emissions, enhance the credibility of State officials when addressing related issues for projects, and encourage more informed transportation and environmental decisions.

Activity Contact

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Additional Resources

- FHWA: Las Vegas, Nevada: Near Roadway Vehicle Emissions Study
- FHWA: Detroit, Michigan: Near Road Collaboration Project

The Gulf Coast Study

FHWA is conducting a multiphase study of climate change in the Central Gulf Coast region to:

- Enhance understanding of potential climate change impacts on transportation infrastructure and the resulting vulnerabilities in the region.
- Identify adaptation strategies for this region and the Nation.
- Develop transferable processes and tools.

Phase 2 of this study, focused on Mobile, AL, assesses the vulnerability of the most critical transportation assets to climate change impacts. Using this information, FHWA is developing risk management tools to help transportation system planners, owners, and operators assess vulnerabilities and determine which assets to protect and how to protect them. The methods and tools developed are designed to be replicable in regions nationwide.

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Additional Resources

• Gulf Coast Study

Objective: 5: Improve the way transportation contributes to economic development and communities' quality of life.

Strategies

- Identify and promote strategies that strengthen national security and economic development through transportation planning, programming, operations, and management.
- Identify and promote strategies that address congestion reduction efforts to improve quality of life and economic development.
- Identify and promote strategies that support equity, access, and public engagement to strengthen the ability of communities to respond to citizens' needs.
- Research and promote strategies to advance livability and improve transportation planning, programming, operations, management, and decisionmaking in rural areas and small communities.

Showcase Activities

- Stochastic Empirical Loading and Dilution Model (SELDM)
- National Highway System (NHS) Connections to Airports in the New **England States**
- Greening Transportation at the Border: Analysis of Air Quality
- Evaluation of Methodologies for Visual Impact Assessments
- A Study of Reverse Mortgages in Relocation Assistance
- Gateways and Corridors Concepts
- Pedestrian Bicycle

Stochastic Empirical Loading and Dilution Model (SELDM)

Stochastic Empirical Loading and Dilution Model uses information and data about a highway site, water quality of upstream receiving waters, precipitation events, storm-flow, and the performance of mitigation measures to help determine pollutant loading levels for planning of National Environmental Policy Act-level studies. This robust model was tested by Federal Highway Administration, many State departments of transportation, the U.S. Environmental Protection Agency, academia, and several other regulatory agencies.

Activity Contact

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Additional Resources

- U.S. Geological Survey: National Highway Runoff Water-Quality Data and Methodology Synthesis
- National Stormwater Best Management Practices **Database**

National Highway System (NHS) Connections to Airports in the New England States

Connector highways to airports are a major element of surface transportation systems and a vital component of both the Nation's intermodal systems and its economic success. This study examines the performance of National Highway System connector roads in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. While previous evaluations of National Highway System connectors have focused on freight intermodal terminals, this project represents a fresh look at airports. The study looks at the volume and percentage of airport traffic arriving via the National Highway System; the degree that airports are generally connected to the National Highway System; and how well the National Highway System and its connectors meet the surface transportation needs of airports.

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Additional Resources

• FHWA: National Highway System **Intermodal Connectors**

Greening Transportation at the Border: Analysis of Air Quality

This research establishes a baseline inventory of vehicle emissions data availability at United States/Mexico land border crossings needed for emissions modeling. The study created an emissions analysis template that can be used along the United States/Mexico border to measure emissions and impacts from delay at the border and for analyzing proposed infrastructure or operational improvements to existing or new facilities.

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Additional Resources

• FHWA: United States-Mexico Land Ports of Entry Emissions and Border Wait-Time White Paper and Analysis **Template**

Evaluation of Methodologies for Visual Impact Assessments

This Transportation Research Board Evaluation of Methodologies for Visual Impact Assessments research report identifies a set of best practices that "provide an administratively practical and scientifically defensible, professionally useful approach" for conducting visual impact assessments. Visual impact assessments have been inconsistent across State departments of transportation, prompting a call for a more standard approach. According to the study conducted under the National Cooperative Highway Research Program, Project 25-33, "all [visual impact assessment] methodologies currently being used by transportation agencies could be improved by incorporating one or more of the best practices." The study notes that no agencies are currently using all of the recommended practices.

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Additional Resources

• Transportation Research Board: Evaluation of Methodologies for Visual Impact Assessments

A Study of Reverse Mortgages in Relocation Assistance

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as amended, called the Uniform Act, provides for the fair, consistent, and equitable treatment of people displaced because of a Federal or federally assisted project. The intent is to ensure that the people who are displaced are not disproportionately affected for the benefit of the public as a whole. The research study will provide FHWA with the technical expertise needed to develop guidance for establishing a fair and effective method of addressing reverse mortgages encountered when displacing people in accordance with the Uniform Act.

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Gateways and Corridors Concepts

With the implementation of the Moving Ahead for Progress in the 21st Century Act (MAP-21), the United States is embarking on the development of a National Freight Plan, which includes a gateways and corridors project. The focus of the National Gateways and Corridors Concepts project was to identify and document multimodal corridor and gateway needs, trends and opportunities to ensure U.S. and North American competitiveness for consideration in the development of future national infrastructure plans.

The project work plan consisted of three primary elements: (1) case studies of international freight system planning efforts; (2) documentation of freight transportation needs of strategic U.S. supply chains; and (3) private sector stakeholder input. The common element emerging throughout all three phases was the recognized need for a national freight infrastructure plan and the challenge of developing such a plan because of the uncertainty of future freight transportation needs. The research conducted for the National Gateways and Corridors Concepts project provides numerous factors for consideration as the MAP-21 implementation moves forward.

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Additional Resources

• FHWA National Gateway and Corridor Concepts

Pedestrian Bicycle Information Center

The Pedestrian Bicycle Information Center (PBIC) connects communities with information and resources needed to create safe places for walking and bicycling. The Pedestrian Bicycle Information Center is a national clearinghouse for information about health and safety, engineering, advocacy, education, enforcement, access, and mobility for pedestrians (including transit users) and bicyclists.

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• <u>Pedestrian and Bicycle</u> <u>Information Center</u>

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